We claim:

1. A resonator device comprising:

a first piezoelectric resonator and a second piezoelectric resonator, wherein the first piezoelectric resonator and the second piezoelectric resonator each have a piezoelectric layer having a first surface and a second surface, a first electrode on the first surface and a second electrode on the second surface; and

a detuning layer sequence arranged on the first piezoelectric resonator

wherein

the detuning layer sequence is arranged on the first electrode of the first piezoelectric resonator or on the second electrode of the first piezoelectric resonator; and

the detuning layer sequence comprises at least a first layer having a first acoustic impedance and a second layer having a second acoustic impedance in order to shift a resonance frequency of the first piezoelectric resonator relative to the resonance frequency of the second piezoelectric resonator, wherein the first acoustic impedance is lower than the second acoustic impedance.

2. The resonator device according to claim 1, wherein the acoustic impedances of the layers of the detuning layer sequence differ from each other by the factor 2.

3. The resonator device according to claim 1, wherein the impedance of the layer having a high acoustic impedance is between $60x10^6 \frac{kg}{s \cdot m^2}$ and $100x10^6 \frac{kg}{s \cdot m^2}$, and wherein the impedance of a layer having a low acoustic impedance is between $10x10^6 \frac{kg}{s \cdot m^2}$ and $30x10^6 \frac{kg}{s \cdot m^2}$.

4. The resonator device according to claim 1, wherein the layer having a low acoustic impedance comprises Al or SiO_2.

5. The resonator device according to claim 1, wherein the layer having a high acoustic impedance comprises W, Mo, Pt or Ta_2O_5.

6. The resonator device according to claim 1, wherein the first layer having a low acoustic impedance has a thickness in the range of 50 nm to 200 nm, and wherein the second layer having a high acoustic impedance has a thickness in the range of 10 nm to 60 nm.

7. The resonator device according to claim 1, having a substrate, on which the first and the second piezoelectric resonator are arranged in an acoustically isolated way.

8. The resonator device according to claim 7, wherein a cavity or an acoustic reflector is arranged between the first piezoelectric resonator and the substrate and between the second piezoelectric resonator and the substrate for acoustic isolation.

9. The resonator device according to claim 1, wherein the resonance frequencies of the piezoelectric resonator and of the second piezoelectric resonator differ by 2% to 3%.

10. The resonator device according to claim 1, wherein the second piezoelectric resonator is connected between a first node and a second node, and wherein the first piezoelectric resonator is connected between the second node and a reference potential.

11. The resonator device according to claim 1, wherein the first and the second piezoelectric resonator include a plurality of piezoelectric layers.

12. A filter comprising a resonator device, the resonator device comprising:

a first piezoelectric resonator and a second piezoelectric resonator, wherein the first piezoelectric resonator and the second piezoelectric resonator each have a piezoelectric layer having a first surface and a second surface, a first electrode on the first surface and a second electrode on the second surface; and

a detuning layer sequence arranged on the first piezoelectric resonator

wherein

the detuning layer sequence is arranged on the first electrode of the first piezoelectric resonator or on the second electrode of the first piezoelectric resonator; and

the detuning layer sequence comprises at least a first layer having a first acoustic impedance and a second layer having a second acoustic impedance in order to shift a resonance frequency of the first piezoelectric resonator relative to the resonance frequency of the second piezoelectric resonator, wherein the first acoustic impedance is lower than the second acoustic impedance.

13. A resonator device comprising:

a piezoelectric layer having a first and a second surface,

a first electrode arranged on the first surface and a second electrode arranged on the second surface opposite of the first electrode;

a third electrode arranged on the first surface and a fourth electrode arranged on the second surface opposite of the third electrode; and

a detuning layer sequence arranged on the first electrode or on the second electrode; and

the detuning layer sequence comprises at least a first layer having a first acoustic impedance and a second layer having a second acoustic impedance, wherein the first acoustic impedance is lower than the second acoustic impedance.

14. The resonator device according to claim 13, wherein the acoustic impedances of the layers of the detuning layer sequence differ from each other by the factor 2.

15. The resonator device according to claim 13, wherein the impedance of the layer having a high acoustic impedance is between $60\text{x}10^6 \frac{kg}{s \cdot m^2}$ and $100\text{x}10^6 \frac{kg}{s \cdot m^2}$, and wherein the impedance of a layer having a low acoustic impedance is between $10\text{x}10^6 \frac{kg}{s \cdot m^2}$ and $30\text{x}10^6 \frac{kg}{s \cdot m^2}$.

16. The resonator device according to claim 13, wherein the layer having a low acoustic impedance comprises Al or SiO_2.

17. The resonator device according to claim 13, wherein the layer having a high acoustic impedance comprises W, Mo, Pt or Ta_2O_5.

18. The resonator device according to claim 13, wherein the first layer having a low acoustic impedance has a thickness in the range of 50 nm to 200 nm, and wherein the second layer having a high acoustic impedance has a thickness in the range of 10 nm to 60 nm.

19. The resonator device according to claim 13, having a substrate, on which the piezoelectric layer is arranged in an acoustically isolated way.

20. The resonator device according to claim 19, wherein a cavity or an acoustic reflector is arranged between the piezoelectric layer and the substrate for acoustic isolation.

21. The resonator device according to claim 13, wherein the resonance frequencies of the resonator device differ by 2% to 3%.

22. The resonator device according to claim 13, wherein the third and fourth electrodes are connected between a first node and a second node, and wherein the first and second electrodes are connected between the second node and a reference potential.

23. The resonator device according to claim 13, wherein the piezoelectric layer includes a plurality of piezoelectric layers.